3.5.7.3 For resistors connected in parallel:

$I_{circuit} = I_{R_1} = I_{R_2} = I_{R_3} = \ldots\ldots$

$V_{source} = V_{R_1} + V_{R_2} + V_{R_3} + \ldots\ldots$

3.5.7.4 $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$ or $R_T = \frac{R_1 \times R_2}{R_1 + R_2}$

$\frac{1}{R_T} = \frac{1}{6} + \frac{1}{12}$ or $R_T = \frac{6 \times 12}{6 + 12}$

So, $R_T = 4\ \Omega$ $= 4\ \Omega$

Which is correct for this circuit. $\left(R = \frac{V}{I} = \frac{12}{3}\right)$

3.5.7.5 Reliability is checked by taking multiple readings and increased if the average (excluding outliers) is used in all calculations.

3.5.8.1

A
- Resistance = 4 Ω (6 and 3 in parallel, and this combination in series with the 2)
- Circuit current = 12 A
- Current through 6 Ω = 4 A
- Current through 2 Ω = 12 A
- Current through 3 Ω = 8 A
- Potential across 6 Ω = 24 V
- Potential across 2 Ω = 24 V
- Potential across 3 Ω = 24 V
- Potential of source = 48 V

B
- Total resistance = 5 Ω (4_1 and 4_2 in parallel, and this combination in series with the 3)
- Circuit current = 8 A
- Current through 3 Ω = 8 A
- Current through $4\ \Omega_1$ = 4 A
- Current through $4\ \Omega_2$ = 4 A
- Potential across 3 Ω = 24 V
- Potential across $4\ \Omega_1$ = 16 V
- Potential across $4\ \Omega_2$ = 16 V

C
- Total resistance = 10 Ω (12 and 6_2 in parallel, and this in series with the 6_1)
- Circuit current = 9 A
- Current through $6\ \Omega_1$ = 9 A
- Current through 12 Ω = 3 A
- Current through $6\ \Omega_2$ = 6 A
- Potential across $6\ \Omega_1$ = 54 V
- Potential across 12 Ω = 36 V
- Potential across $6\ \Omega_2$ = 36 V
- Potential of source = 90 V

D
- Total resistance = 8 Ω (6_1 and 6_2 in parallel, and this in series with the 5)
- Circuit current = 6 A
- Current through $6\ \Omega_1$ = 3 A
- Current through $6\ \Omega_2$ = 3 A
- Current through 5 Ω = 6 A
- Potential across $6\ \Omega_1$ = 18 V
- Potential across $6\ \Omega_2$ = 18 V
- Potential across 5 Ω = 30 V
- Potential of source = 48 V

E
- Total resistance = 5 Ω (4 and 12 in parallel, and this in series with the 2)
- Circuit current = 12 A
- Current through 2 Ω = 12 A
- Current through 4 Ω = 9 A
- Current through 12Ω = 3 A
- Potential across 2 Ω = 24 V
- Potential across 4 Ω = 36 V
- Potential across 12 Ω = 36 V
- Potential of source = 60 V

F
Total resistance = 14 Ω (4_1 and 4_2 in parallel, and this in series with the 12)
Circuit current = 6 A
Current through 12 Ω = 6 A
Current through 4 Ω_1 = 3 A
Current through 4 Ω_2 = 3 A
Potential across 12 Ω = 72 V
Potential across 4 Ω_1 = 12 V
Potential across 4 Ω_2 = 12 V
Potential of source = 84 V

G
Total resistance = 6 Ω (3 and 6 in parallel, and this combination in series with the 4)
Circuit current = 2 A
Current through 3 Ω = 1.33 A
Current through 6 Ω = 0.67 A
Current through 4 Ω = 2 A
Potential across 3 Ω = 4 V
Potential across 6 Ω = 4 V
Potential across 4 Ω = 8 V
Potential of source = 12 V

H
Total resistance = 4.67 Ω (4 and 8 in parallel, and this in series with the *R*)
Circuit current = 6 A
Current through 4 Ω = 4 A
Current through 8 Ω = 2 A
Current through *R* Ω = 6 A
Potential across 4 Ω = 16 V
Potential across 8 Ω = 16 V
Potential across *R* Ω = 12 V
Potential of source = 28 V
Value of resistor *R* = 2 Ω

I
Total resistance = 6 Ω (6_1 and 6_2 in parallel, and this in series with the 3)
Circuit current = 3 A
Current through 6 Ω_1 = 1.5 A
Current through 6 Ω_2 = 1.5 A
Current through 3 Ω = 3 A
Potential across 6 Ω_1 = 9 V
Potential across 6 Ω_2 = 9 V
Potential across 3 Ω = 9 V
Potential of source = 18 V
Reading on meter A = 1.5 A

J
Total resistance = 4 Ω (8 and 4 in series, and this in parallel with the 6)
Circuit current = 9 A
Current through 8 Ω = 3 A
Current through 4 Ω = 3 A
Current through 6 Ω = 6 A
Potential across 8 Ω = 24 V
Potential across 4 Ω = 12 V
Potential across 6 Ω = 36 V
Potential of source = 36 V
Reading on meter A = 3 A

3.6.1.1

(a) Transformers are used to increase or decrease the voltage supplied to homes so that the correct voltage is used with particular electrical devices.

(b) Step-up transformers increase the supply voltage to a higher value.
Step-down transformers decrease the supply voltage to a lower voltage.

(c) Step-up transformers have more coils in their output coil than in their input coil.
Step-down transformers have fewer coils in their output coil than in their input coil.

(d) The voltage is directly proportional to the number of turns in the coils.